AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A radiation detector assembly, comprising:

a semiconductor detector array substrate, comprising CdZnTe or CdTe, having a plurality of detector cell pads on a first surface thereof said pads comprising a contact metallization and a solder barrier metallization;

an interposer card, comprising a comprises a ceramic or polymer laminate printed circuit and having planar dimensions no larger than planar dimensions of the semiconductor detector array substrate,

a plurality of interconnect pads on a first surface thereof,

at least one readout semiconductor chip and at least one connector on a second surface thereof,

each having planar dimensions no larger than the planar dimensions of the interposer card;

solder columns that extend from contacts on the interposer first surface to the plurality of pads on the semiconductor detector array substrate first surface,

said solder columns comprising at least one solder having a melting point or liquidus less than 120 degrees C; and

an encapsulating resin between said interposer circuit card first surface and the semiconductor detector array substrate first surface, encapsulating said solder columns,

said encapsulating resin curing at a temperature no greater than 120 degrees C, such that said encapsulating resin at least partially cures at the same time as a process of reflowing said solder having the melting point or liquidus less than 120 degrees C,

wherein the cured encapsulating resin provides mechanical stability to the solder joints having a melting point or liquidus less than 120 degrees C connecting the semiconductor chip and interposer card by adding mechanical strength to the assembly.

2. (previously presented) The assembly of claim 1 wherein said encapsulating resin comprises a cured polymer fluxing agent.

3. (original) The assembly of claim 1 wherein said contact metallization comprises a layer of one selected from the list that includes Pt, Au, Al, Ni, Pd, and Ti.

4. (original) The assembly of claim 1 wherein said barrier metallization comprises one or more layers of metals selected from the list that includes Ni, Au, Ti, V, and Cu.

5. (currently amended) A method for making a detector array assembly that comprises the steps of:

providing a semiconductor detector array substrate comprising CdZnTe or CdTe having a plurality of metallized detector cell pads on a first surface thereof, said pads comprising a contact metallization and a solder barrier metallization on a first surface thereof;

providing an interposer card having planar dimensions no larger than the planar dimensions of the semiconductor detector array substrate,

at least one readout semiconductor chip on a second surface thereof, and

at least one connector on a second surface thereof,

each of planar dimensions no larger than the planar dimensions of the interposer card,

a plurality of discrete solder bumps on a first surface thereof at least one bump corresponding to at least one pad on said semiconductor detector array substrate, the discrete solder bumps having a low temperature melting point,

disposing an encapsulating resin as a fluxing agent and encapsulant between the interposer card and the semiconductor detector array substrate, the encapsulating resin having a curing temperature no greater than 120 degrees C;

mating the interposer card first surface to the semiconductor detector array substrate first surface, wherein the solder bumps face towards and are aligned with their corresponding pads, such that there exists fluxing agent at least between said bumps said detector substrate pads;

heating the combined unit to a temperature not exceeding 120 degrees C, allowing sufficient time for at least a portion of the solder to melt and bond to the detector substrate, the bonding accomplished by aligning and contacting the discrete solder bumps to the solder coating electrodes of the detector, followed by solder reflow of the low-melting point solder without reflow of the solder barrier metallization;

cooling to allow the solder to harden; and

curing the encapsulating resin a temperature no greater than 120 degrees C, said encapsulating resin at least partially curing at the same time as a process of reflowing the solder, wherein the cured encapsulating resin provides mechanical stability to low melting point solder joining the semiconductor chip and interposer card assembly by adding mechanical strength to the assembly.

6. (previously presented) The method of claim 5 wherein said solder bumps comprise a solder with a melting point or liquidus less than 120 degrees C.

7. (previously presented) The method of claim 5 wherein said metallized detector cell pads further comprise a solder with a melting point or liquidus less than 120 degrees C.

8. (previously presented) The method of claim 5 wherein, after cooling, a liquid encapsulating resin is introduced between the two first surfaces and cured a temperature no greater than 120 degrees C.

9. (previously presented) The method of claim 5 wherein said encapsulating resin comprises a fluxing agent and further comprises a polymer encapsulant that cures at a temperature no greater than 120 degrees C.

10. (previously presented) The method of claim 9 wherein heating of the said combined unit and encapsulating resin continues sufficiently to fully harden said encapsulating resin.

11. (previously presented) The method of claim 9 wherein heating of the said combined unit melts the solder and simultaneously hardens the encapsulating resin.

12. (previously presented) The method of claim 5 wherein heating of the said combined unit and encapsulating resin proceeds sufficiently to fully harden said encapsulating resin.

13. (original) The method of claim 5 wherein said contact metallization comprises a layer of one selected from the list that includes Pt, Au, Al, Ni, Pd, and Ti.

14. (original) The method of claim 5 wherein said barrier metallization comprises one or more layers of metals selected from the list that includes Ni, Au, Ti, V, and Cu.

15. (original) The method of claim 5 wherein said cell pads metallization further comprises a solder having a melting point or liquidus below 120 degrees C.

16. (original) The method of claim 5 wherein said cell pads metallization further comprises a solder having a melting point or liquidus below 120 degrees C.

17. (original) The method of claim 5 wherein said solder bumps further comprises a solder having a melting point or liquidus below 120 degrees C.

18. (previously presented) The method of claim 5 wherein said solder bumps comprise a solder with a melting point or liquidus less than 120 degrees C, such that said encapsulating resin at least partially cures at the same time as a process of reflowing said solder having the melting point or liquidus less than 120 degrees C.

19. (previously presented) The method of claim 10 wherein the encapsulating resin includes at least one portion capable of remelt at a temperature below 120 degrees C sufficiently to allow separation of the assembly after assembly and hardening, thereby permitting repair of the assembly without damage.

20. (New) A radiation detector assembly, comprising:

a semiconductor detector array substrate, comprising CdZnTe or CdTe, having a plurality of detector cell pads on a first surface thereof said pads comprising a contact metallization and a solder barrier metallization;

an interposer card having planar dimensions no larger than planar dimensions of the semiconductor detector array substrate; and

the radiation detector assembly fabricated in accordance with the method of claim 5.